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In February 2014, the U.S. Air Force School of Aerospace Medicine Epidemiology Consult Service provided support in response to a moderate outbreak of influenza at the Transit Center at Manas (Kyrgyzstan). A total of 215 individuals presented with influenza-like illness symptoms from 3 December 2013 through 28 February 2014. There were 85 specimens positive for influenza (18 influenza A(H1N1)pdm09, 65 influenza A(H3N2), one influenza A/not subtyped, and one influenza B); six specimens were positive for other respiratory viruses (one human metapneumovirus, two parainfluenza, and three rhinovirus/enterovirus) and eight specimens were negative. Twenty-two of the specimens that were positive for influenza were sequenced and were not remarkably different from the strains seen during routine surveillance for the 2013–2014 season or from specimens collected at other deployed sites.

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Influenza A(H3N2) Outbreak at Transit Center at Manas, Kyrgyzstan, 2014

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In February 2014, the U.S. Air Force School of Aerospace Medicine Epidemiology Consult Service provided support in response to a moderate outbreak of influenza at the Transit Center at Manas (Kyrgyzstan). A total of 215 individuals presented with influenza-like illness symptoms from 3 December 2013 through 28 February 2014. There were 85 specimens positive for influenza (18 influenza A(H1N1)pdm09, 65 influenza A(H3N2), one influenza A/not subtyped, and one influenza B); six specimens were positive for other respiratory viruses (one human metapneumovirus, two parainfluenza, and three rhinovirus/enterovirus) and eight specimens were negative. Twenty-two of the specimens that were positive for influenza were sequenced and were not remarkably different from the strains seen during routine surveillance for the 2013–2014 season or from specimens collected at other deployed sites.

The high burden of respiratory illness in military populations has been well documented.[1] In fact, respiratory illness is one of the most common causes of lost time from duty among young adults in the military.[2] A number of factors are thought to contribute to this phenomenon, including close-contact training environments, physical and psychological stresses of military training, and service members' immunologic naiveté that could increase vulnerability to infectious disease when first brought together as a group.[2]

In 2012, a cluster of influenza-like illness (ILI) in the 376th Expeditionary Wing at Manas Air Base, Kyrgyzstan, led to the establishment of protocols for shipping viable specimens to the Epidemiology Laboratory at U.S. Air Force School of Aerospace Medicine (USAFSAM) from an area of the globe where routine respiratory surveillance was not otherwise established. After establishing this capacity, 28 viable specimens were successfully delivered to USAFSAM for testing, with influenza A(H3N2) identified as the predominating strain (26 [93%] specimens). The protocols established in 2012 facilitated the collection, shipment, and testing of specimens when the outbreak of ILI described in this report occurred in 2014.

The Transit Center at Manas was a U.S. military installation located at the Manas International Airport near Bishkek, the capital of Kyrgyzstan (official name: Kyrgyz Republic). It was opened in December 2001, following the 11 September 2001 attacks, and was operated by the 376th Air Expeditionary Wing. The 376th Expeditionary Medical Group Public Health Office provided disease surveillance, preventive medicine, and public health services to all personnel assigned to the 376th Expeditionary Wing, tenant units, and coalition forces. The Transit Center at Manas also served as a year-round sentinel site for the Department of Defense (DoD) Global, Laboratory-based, Influenza Surveillance Program. The Center was turned over to the Kyrgyz Republic on 3 June 2014 and U.S. military operations there ceased.

Since 2001, coalition personnel and aircraft from 26 nations operated out of the Transit Center to support operations in Afghanistan. During the period described in this report, approximately 1,500 U.S. military personnel were considered permanent party and were assigned to the wing, along with approximately 900 U.S. and host-nation contractor personnel who provided daily support to various base missions. As the gateway to Afghanistan, the Transit Center averaged 2,000 transient troops per day, each staying approximately 48 hours before going into, and 72 hours after coming out of, Afghanistan.

METHODS

The DoD Global, Laboratory-based, Influenza Surveillance Program is a collaborative program that was formalized in 1999 by the Assistant Secretary of Defense for Health Affairs (DoD Health Affairs Memorandum 99-008). The surveillance program is based on sentinel sites and currently maintains a network of more than 90 such sites. Sentinel sites are requested to submit six to 10 respiratory specimens per week from individuals meeting the ILI case definition. All deployed locations, including the former Manas Air Base, are or were sentinel sites.[3] In 2013, Manas public health confirmed that the installation was still a sentinel site, although the base was in its final transition to closure. Necessary equipment and processes were validated to successfully submit specimens to USAFSAM by collaborating with the laboratory office at Bagram Air Base, Afghanistan (for the purpose of forwarding specimens to Landstuhl Regional Medical Center [LRMC] for testing) and with the Transportation Management Office at Manas.

Case finding

Beginning in early December 2013, Manas clinic providers began to see more permanent and transient party personnel seeking medical attention for ILI. The ILI case definition developed by the DoD Global, Laboratory-based Influenza Surveillance Program is: oral temperature

of 100.5°F or higher and cough or sore throat. However, most patients presenting in Manas had low-grade fever; therefore, providers on 15 January 2014 at Manas modified the case definition to lower the criterion for temperature to 99.0°F or higher. Public Health officials at Manas identified individuals presenting with ILI, and recorded other demographic and clinical information regarding the patients, including squadron, shop, dorm/tent, hospitalization status, influenza vaccine type and date of administration, and date and results of rapid testing for influenza. Vaccination status and date were determined via medical record review.

Control measures

Various preventive measures were implemented at the Transit Center by Public Health, including patient isolation, strict hand washing, cough etiquette, and education/awareness. Isolated patients were not allowed to return to work until they reached the end of the mandatory 7-day exclusion period and had been asymptomatic for at least 24 hours.

Patients were prescribed oseltamivir (an antiviral medication) for influenza treatment at the treating physician's discretion. In some cases, roommates and coworkers of patients were given oseltamivir as a preventative measure. Healthcare workers involved in direct patient care were also offered oseltamivir prophylaxis and advised to wear a protective mask while in the same room as any patient exhibiting respiratory symptoms. While collecting nasal wash specimens, each technician wore a mask, gown, gloves, and eye protection.

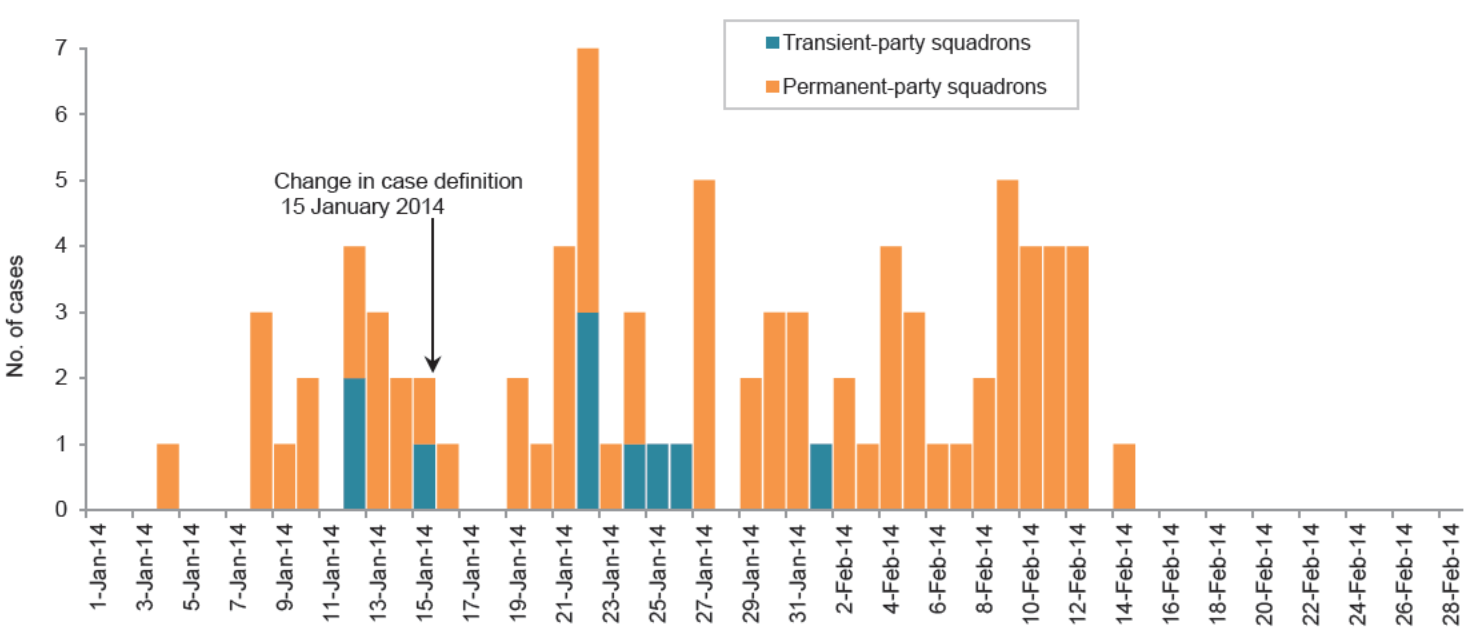
During the height of the outbreak and well beyond the identification of the final cases, correspondence between USAFSAM Epidemiology Consult Service and Public Health at Manas was constant to assure logistics support for specimen shipment, laboratory test results, and epidemiologic analysis support.

RESULTS

A total of 215 individuals met the previously described ILI case definitions from 3 December 2013 to 28 February 2014. Prior to the first laboratory-confirmed positive case of influenza, there were seven ILI cases in December and one in January. The first laboratory-confirmed positive case of influenza was seen on 4 January 2014 **(Figure 1)**. Of the 215 patients identified, 86 met the altered ILI case definition implemented by Manas providers, as these individuals presented with low-grade fever (average temperature 99.6°F). Out of all ILI cases (n=215), three were hospitalized and each had a fever of 100.5°F or higher. Final laboratory results for specimens from these three patients were: one positive for influenza A(H1N1)pdm09, one negative, and one untestable specimen.

All patients presenting with ILI received a rapid flu test; rapid test results showed that 69 (32.1%) were positive for influenza (65 A, two B, and two unknown) and 146 were negative. Nasal wash specimens were collected on 111 (51.6%) individuals and 99 specimens were tested at LRMC. Patients with a positive rapid test (n=69), meeting either ILI case definition with a negative rapid test (n=23), or suspected to have influenza by a providing clinician (n=19) submitted a nasal wash. Of the 111 nasal wash specimens, 12 were not tested at LRMC due to transportation issues (n=9), a freezer outage (n=2), or improper accessioning (n=1). Eighty-five (76.6%) specimens were positive for influenza, including 18 A(H1N1)pdm09 (21.2%), 65 A(H3N2) (76.5%), one A/not subtyped (1.2%), and one B (1.2%). Seven with positive influenza tests had co-infections: one

FIGURE 1. Laboratory-confirmed influenza cases by date and personnel party, Manas Transit Center, January 2014–February 2014

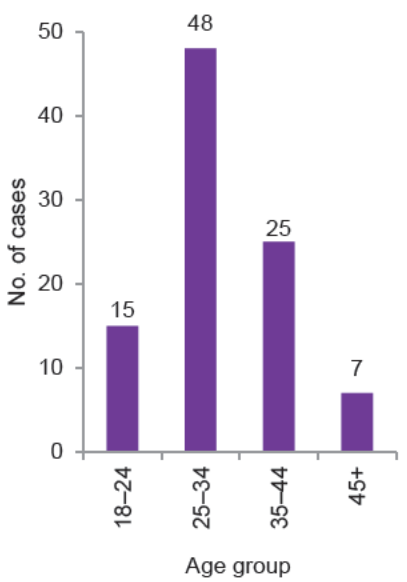


influenza A(H1N1)pdm09 and respiratory syncytial virus, five influenza A(H3N2) and rhinovirus/enterovirus, and one A(H3N2) and human metapneuomovirus. Six (5.4%) specimens were positive for other respiratory viruses, including one human metapneumovirus, two parainfluenza, and three rhinovirus/enterovirus. Eight (7.2%) specimens were determined to be negative.

Descriptive epidemiology

Not all descriptive data were complete for the 111 cases who submitted nasal wash specimens. Cases with unit information available (n=99) were spread among 30 squadrons (18 permanent party squadrons and 12 transient squadrons) and were seen in mostly permanent party personnel (88%). Of the 101 cases with data on their sex, 80% were males. The average age of cases with known age (n=95) was 32 years, and ages ranged from 20 to 56 years **(Figure 2)**. All cases had been vaccinated by live attenuated influenza vaccine (LAIV) (n=70) or inactivated influenza vaccine (IIV) (n=41). There was an average of 18 weeks from vaccination to illness onset (n=96; range 6–31 weeks) **(Figure 3)**.

FIGURE 2. Number of laboratory-confirmed influenza cases by age group, Manas Transit Center, January 2014–February 2014



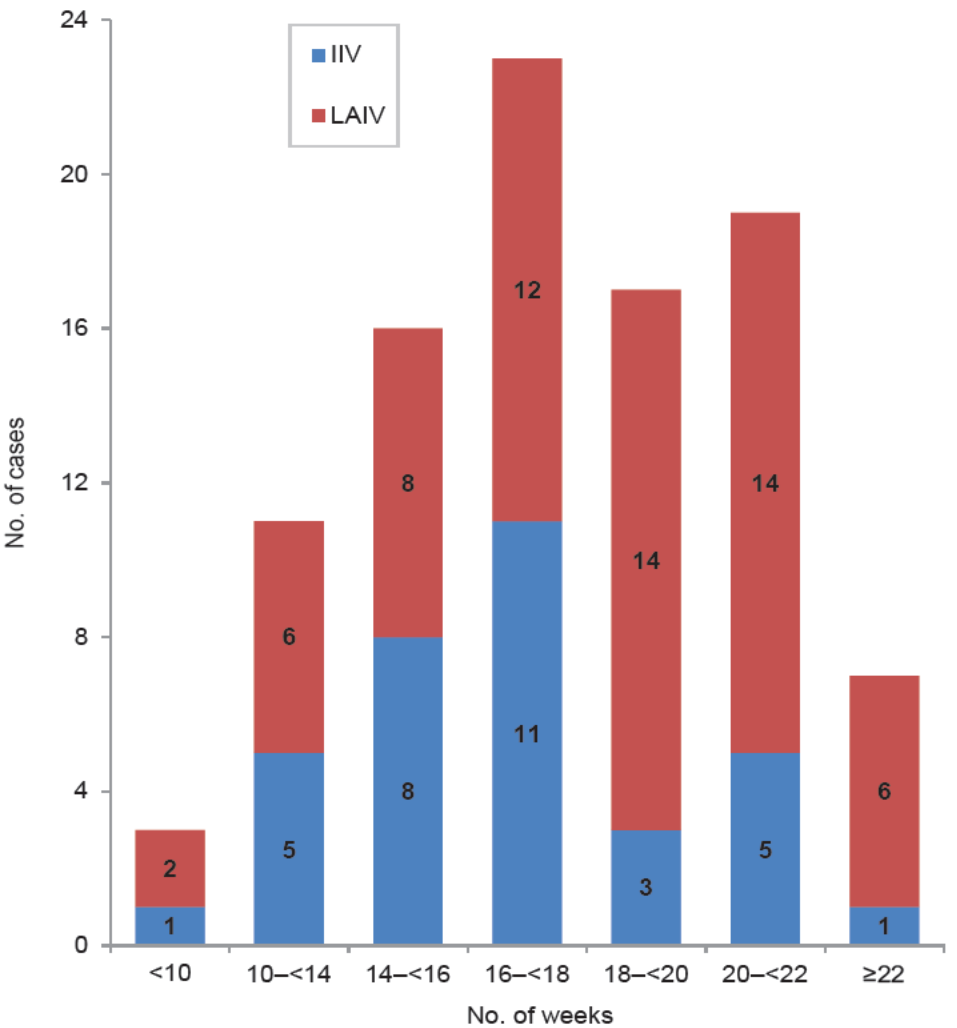
Molecular sequencing results

Among specimens positive for influenza, 3 influenza A(H1N1)pdm09, 18 influenza A(H3N2) and 1 influenza B were sequenced. The influenza B specimen characterized as a Yamagata lineage was similar to the majority of influenza B specimens characterized during the 2013–2014 season. The influenza A(H1N1)pdm09 specimens were also characterized in the predominant group of influenza A(H1N1)pdm09 for the season. The 18 influenza A(H3N2) specimens clustered into a group that included the majority of A(H3N2) specimens characterized by USAFSAM surveillance, which were distinguished by two point mutations. Furthermore, the influenza A(H3N2) specimens all shared an additional point mutation and clustered with other specimens collected at deployed sites.

EDITORIAL COMMENT

This report documents a moderate outbreak of ILI that affected transient and permanent party personnel at the Transit Center at Manas. Investigation did not reveal a source of influenza introduction into the population. It is possible that

FIGURE 3. Number of weeks from influenza vaccination to illness onset by vaccine type, Manas Transit Center, January 2014–February 2014



IIV=inactivated influenza vaccine; LAIV=live, attenuated influenza vaccine

many infected individuals had mild symptoms and no fever; such persons might never have sought medical attention but continued to carry out their normal activities while infectious, aiding in the person-to-person spread of the influenza virus. Although data are not available to retrospectively determine how many additional ILI cases would have been added with earlier adoption of the altered ILI case definition, it is not expected that the number of cases would have increased dramatically because providers identified early in the outbreak that the temperature criterion needed to be reduced before the altered ILI case definition was formally applied. The multipeaked epidemic curve was driven primarily by the permanent party personnel and cannot be fully attributed to the rapid movement of troops both into and out of the Transit Center **(Figure 1)**.

With the objectives of preserving readiness and enhancing force health protection, annual vaccination against influenza is mandatory, but past vaccine effectiveness analyses have shown lower vaccine effectiveness among military personnel than civilians and dependents.[4,5] Repeat vaccination may be a contributing factor; immunogenicity studies have shown attenuated immunologic response with repeated vaccine receipt. In addition, immunologic response may vary based on the degree of similarity between vaccine strains across years.[6]

In this outbreak, all cases had been vaccinated with either IIV or LAIV. Although no evidence has been found to support this, it is possible that vaccination against influenza contributed to the decreased severity of illness among cases. Further research to understand the effect of vaccination on symptom severity among flu cases is warranted to further elucidate these findings. The majority of cases were seen 4 months or more after vaccination, suggesting that waning immunity may have played a role in this outbreak. Recent studies suggest that time since vaccination may be associated with risk of influenza infection, suggesting the plausibility of waning vaccine induced protection against influenza over time.[7,8]

In Asia, according to World Health Organization reports, both influenza A(H1N1)pdm09 and A(H3N2) viruses were circulating during the time of this outbreak.[9] This is consistent with the distribution of results at Manas. As the gateway to Afghanistan, there was constant mixing of individuals at Manas; an outbreak in this environment is not surprising.

Although most sequenced cases of influenza followed molecular patterns found in other parts of the world, the influenza A(H3N2) found in the Manas Transit Center was distinguished by two point mutations. This finding supports the premise that novel or emerging strains from geographically diverse populations could be detected with molecular sequencing laboratory techniques, though novel strains were not detected in this outbreak.

In the future, all sentinel sites, especially deployed locations and sites resembling Manas Air Base, should be prepared to conduct influenza surveillance prior to the start of flu season and to respond quickly in an outbreak situation. The Manas Transit Center outbreak is an example of how an influenza outbreak may not be associated with high fever in DoD populations; therefore, implementation of surveillance with higher sensitivity case definitions may be necessary to identify cases. The DoD Global, Laboratory-based, Influenza Surveillance Program is dedicated to ensuring force health protection and decreasing influenza morbidity. Deployed and other sites should contact program personnel for support when an outbreak is recognized.

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